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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,518	01/07/2005	Tadashi Matoba	040302-0453	5843

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EXAMINER

CREPEAU, JONATHAN

ART UNIT	PAPER NUMBER
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1795

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/520,518	Applicant(s) MATOBA, TADASHI	
	Examiner Jonathan S. Crepeau	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14 and 15 is/are rejected.
- 7) ☒ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/7/08 4/5/05 9/20/06</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 8 is objected to because of the following informalities: in line 3, "reaches" should be "reaching" or "to reach." Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 2-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites "a given range" in the last line. It is unclear if this is referring to "the given range" recited in claim 1 or if it is defining a different range.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 8, 14, and 15 are rejected under 35 U.S.C. 102(a) and (e) as being anticipated by WO 03/052846. The reference teaches a fuel cell system comprising a fuel cell (2), a catalytic combustor (9) connected to the anode off-gas (26), the cathode off-gas (27), the fuel inlet stream (23) and the air inlet stream (29) (see Fig. 1A). Valves (23, 30) corresponding to the claimed “anode off-gas control valve” and “cathode off-gas control valve” control the supply of the air and the fuel streams. Additionally, the fuel injector (11) can function as the claimed anode off-gas control valve and is connected to a fuel supply (13). During startup of the fuel cell system, a controller (31) is operative to control the injector and the air valve (30) to inject a fixed amount of fuel gas Q_{f1} into the combustor (see page 8, line 22 et seq). The catalyst temperature T_c is then measured. When this value reaches a threshold value T_{c1} , the claimed step of “discriminating to be sufficiently activated” is carried out. The fuel amount through then injector is then increased to a value Q_{f2} . During the “ignition period,” i.e., fuel flowrate of Q_{f1} , an excess air ratio λ_1 can be in a range of 2-3 (see page 11, line 6). After activation (when $T_{c1}=T_c$), the excess air ratio λ_2 is in a range of 4-5. Thus, the fuel concentration during the ignition period is higher than the fuel concentration after the ignition period. The fuel concentration is therefore kept “in a given range” in the ignition period, and after the ignition period has elapsed, the mixed gas is available to the combustor even if the fuel gas concentration is outside the given range, as claimed. Regarding claim 8, the given range is determined to

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exceed a fuel concentration greater than a value that causes a combustion temperature to reach an activating temperature (Tc1; see page 10, lines 31-35).

Regarding independent claim 14, the following analysis is made with regard to the "means" clauses in the claims. The limitations "fuel gas supply means for supplying fuel gas" and "oxidant gas supply means for supplying oxidant gas" **are** considered to invoke 35 USC 112, sixth paragraph. The limitations "catalytic combustor means for combusting...", "anode off-gas valve means for supplying...", and "cathode off-gas valve means for supplying..." **are not** considered to invoke 35 USC 112, sixth paragraph because the "means" clauses are modified by structure. See MPEP 2181. Further, "control means operative to control..." **is not** considered to invoke 35 USC 112, sixth paragraph because the word "means" is not followed by the word "for" and functional language.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2, 7 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/052846.

The reference is applied to claims 1 and 8 for the reasons stated above. However, the reference does not expressly teach that the average fuel concentration is controlled to lie within a given range as recited in claim 2, or that the given range is determined to be less than a concentration forming a flammable limit of the mixed gas, as recited in claims 9-11.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use a fuel concentration during the ignition period that is lower than a flammable limit of the mixed gas. Such a configuration would be advantageous from the standpoint of safety, and it would therefore be obvious to the skilled artisan.

Regarding claim 2, it would also be obvious to control the fuel concentration such that it has an average value lying within the given range. It is well-known to use time-dependent variations, including averages, in fuel cell control schemes. In this case, the WO '846 already appears to control the fuel and air to have an average value lying within the given range because the ratio of fuel to air is substantially fixed. Accordingly, the average fuel concentration over time would not change, thereby rendering the claimed subject matter obvious.

Regarding claim 7, it would also be obvious to control the fuel concentration such that it is maintained at the maximum concentration lying in the given range during the ignition period. Such a control step would allow the quick and efficient startup of the combustor until it reaches ignition, since a higher fuel concentration would result in a hotter combustion. Accordingly, the subject matter of claim 7 would also be rendered obvious.

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8. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/052846 as applied to claim 11 above, and further in view of Okamoto (U.S. Pre-Grant Publication No. 2002/0177016).

WO '836 does not expressly teach that the pressure and temperature of the anode off-gas are measured and used to estimate a flow rate of the anode off-gas, and further wherein a demanded flow rate of cathode off-gas is calculated from the estimated anode off-gas flow rate, and controlling the cathode off-gas control valve in response to the calculation result.

In [0034], Okamoto teaches a system wherein the flow rate of the air supplied to a combustor is controlled based on the flow rate of the anode effluent supplied to the combustor.

Therefore, it is submitted that the artisan would be motivated to use the control scheme of Okamoto et al. in the system of WO '846. Such a control would be useful when the system is running at steady state to properly control the air to fuel ratio inside the combustor.

Okamoto does not expressly teach that the anode effluent flow rate is estimated based on temperature and pressure of the anode effluent stream.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the use of other parameters to calculate a fluid flow rate is well-known to those skilled in the art. It would be obvious to employ any of these known means, such as temperature and pressure measurements, to calculate and/or estimate the anode effluent flow rate of WO '836/Okamoto. As such, claim 12 would be rendered obvious.

Allowable Subject Matter

9. Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Claims 3-6 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter:

Dependent claims 3-6 each recite that the controller controls the various gas streams to be intermittently supplied, transiently incremented, or transiently decremented. WO '846 teaches that its fuel and air flowrates are substantially fixed, and thus does not fairly suggest the claimed subject matter.

Dependent claim 13 recites, among other features, that the controller stores an anode off-gas supply pattern indicative of the given fuel concentration and is responsive to the estimated flow rate of the anode off-gas to select the pattern for controlling the flow rate. The art of record does not teach or fairly suggest this configuration.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan, can be reached at (571) 272-1292. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jonathan Crepeau/
Primary Examiner, Art Unit 1795
September 18, 2008